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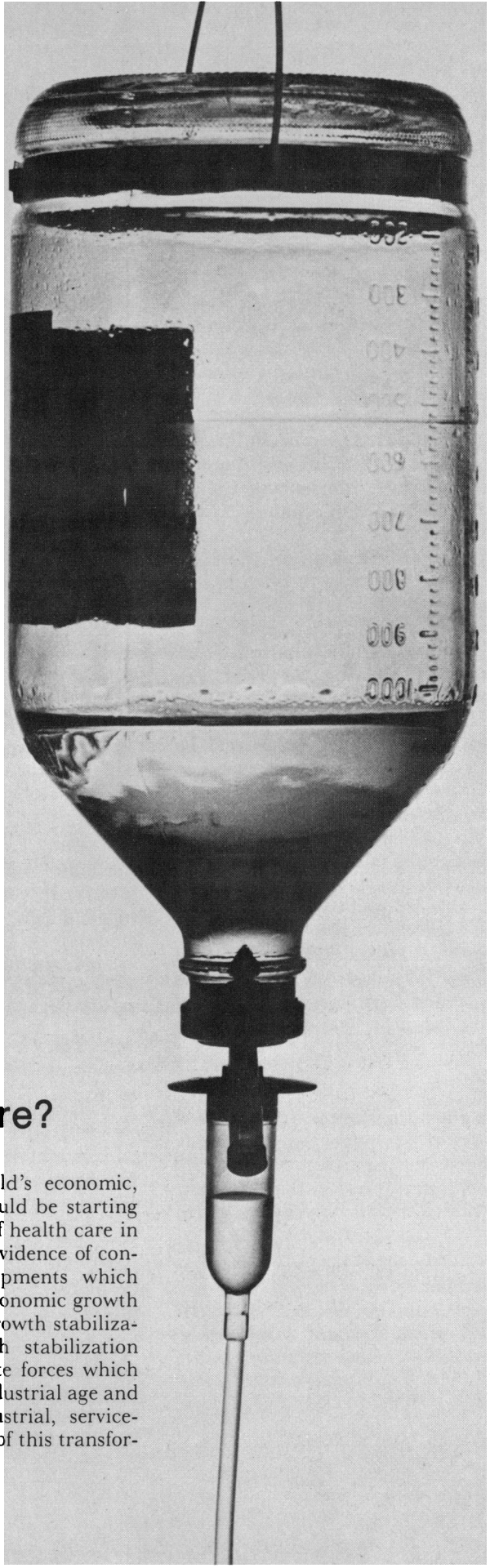

Will Shortages of Raw Materials and Rising Prices Hurt Our Chances for Better Health Care?

A REALISTIC ASSESSMENT of the world's economic, political, and environmental status should be starting to generate anxieties about the future of health care in this country, but there is no apparent evidence of concern despite the many recent developments which suggest that an era of unprecedented economic growth is being forced to yield to a period of growth stabilization. In the likely event that growth stabilization emerges as the new trend, it will create forces which will move the United States out of its industrial age and propel it reluctantly into a post-industrial, service-oriented era. The stepwise progression of this transfor-

mation will cause a painful confrontation with what I choose to call "the forces of compression." To adapt, decisionmakers in all disciplines will have to reorient their thinking from growth and consumption as indices of success and accept as their criteria the effective management of people and scarce material resources. The requirement for such an unpleasant transition is so apparent that managers in the health sector can no longer afford to ignore the need for major changes in their current operational procedures.

As the nation's largest service-oriented sector, I submit that health professionals are in a unique position to assume a role of national leadership in the approaching era of unavoidable employment dislocations and social changes which are bound to follow in the wake of the uncontrollable realignment of economic wealth and power among the world's nations. Since abrupt lifestyle changes are certain to affect the mental and physical well-being of nearly everyone, the emergence of leadership from the health sector seems both necessary and appropriate.

If the health community, in all its facets, is to act responsibly on these issues, it must create an administrative entity which enables it to monitor and reach a clear understanding of the rapidly approaching economic and social realities which will affect it. As national wealth continues to shift along its predictable course, this body should be the instrument by which necessary changes in health operations are managed. The health community can implement this role by designing, developing, and disseminating modified procedures for the delivery of health services which, if used, will restrict the consumption of energy and materials while preserving health care quality. If properly structured, the revised procedures should also result in lowering the overall costs of health care by decreasing waste and unwarranted consumption. For lack of a better name, I have elected to call this multipurpose entity the National Health Planning Council for Energy and Materials. This paper will show a compelling need for such a council to emerge from the ranks of those directly and indirectly responsible for providing patient care.

Changing Times

If the assessments and projections of the availability of raw materials presented in this paper are reasonably valid, then the challenge to health professionals should be clear. They must intellectually accept that shortages and rising prices are now a fact of American life and that the time has come to reevaluate current procedures. Wherever possible, steps should be taken to reduce reliance on all supplies used to provide health care. Success in such an effort is essential as the nation approaches a period of austerity or, as Toynbee describes it, a "siege economy." Success is also important because it will enable the health system to deliver the maximum quantity of quality care under the difficult circumstances which are projected by many authorities. The accomplishment of such a huge undertaking will not be easy, and it will challenge the ingenuity of health's many disciplines, supporting industries, and associations. Further, it will require enhanced communications and increased cooperation among these groups which, heretofore, have not always worked closely together.

The general turbulence precipitated by the oil embargo of 1973-74 makes it difficult to answer the question: Will shortages of raw materials and rising prices hurt our chances for better health care? However, if one carefully examines the areas of general agreement about the outlook for supplies of domestic energy and materials and then analyzes the changing economic and political realignments among nations which are resulting from the location of many vital resources, it becomes possible to derive a working answer to this question. In this paper I will attempt to give a brief overview of the prevailing and projected situation and make some recommendations for coping with the changes it seems to dictate. As a first step, I will identify five critical concepts upon which there appears to be general agreement.

1. The successful cartel of the Organization of Petroleum Exporting Countries (OPEC) has caused the biggest and fastest shift of wealth in the world's history. In early 1974, it was estimated that the combined effects of increased oil production and prices would cause the transfer of $50--60 billion from the oil importing nations to the oil exporting countries during 1974 and that the OPEC nations would accumulate about 300 billion surplus dollars by 1980 *(1)*.

2. The United States is now dependent on a wide variety of imported raw materials *(2a)*.

3. Readily available energy is a commodity critical to the United States' economic health. There is a high correlation between the per capita electrical energy consumption and a nation's gross national product (GNP) *(3)*.

4. The world has entered a period in which shortages of basic commodities are causing serious economic, social, and political problems for the United States and other countries *(4)*.

5. Increasingly interdependent international economic relationships, the burgeoning global population, enhanced international communications, and an unprecedented wave of technological developments have raised consciousness levels and altered the expec-

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tations of nearly all the world's peoples. These events and others have set the stage for a period of rapid transition in world affairs.

The forces causing sudden and dramatic global economic changes appear to be relentless, unyielding, and irreversible. They have generated a need for planners in all disciplines who are able to recognize and accept these profound economic shifts and to plan creatively within the constraints they impose. Health professionals, particularly, need to function in this manner because the quality and quantity of patient care services have now become critically dependent upon how clearly and quickly health decisionmakers perceive and act upon these historic events that are taking place. Those who wish to preserve the health care system must begin soon to identify the new trends and then take decisive actions which reflect a recognition that the changes now occurring are ultimately going to limit the availability of products and energy considered essential to patient care. These actions must include the use of planning techniques that are flexible enough to permit the rapid integration of mid-course adjustments which may be required to cope with artifically induced shortages. To better understand the urgency of these matters, consider first the energy picture.

Energy-Related Problems

There are no reasons at this time to predict a serious domestic energy shortfall before 1976; however, temporary, local power supply shortages should be anticipated. The price of crude oil is not likely to change significantly in the near future. There are, however, some longer term, energy-related considerations which are noteworthy.

- Technological difficulties (primarily related to health and safety considerations), environmentalists' intervention, and labor union negotiations have combined to delay the construction of nuclear power plants by an average of 25 months *(5,6)*.

- Available domestic supplies of natural gas are diminishing, and the Federal Power Commission predicts that natural gas production will fall nearly 11 percent short of meeting contractual commitments during the winter of 1974–75 *(7)*.

- Domestic oil production is continuing to decline, despite a sharp increase in explorations *(8)*.

- The transport of coal to power plants will present expensive and complex obstacles to gaining more energy from this source *(9)*.

- The nationwide coal strike, beginning at the onset of the winter season, will shorten total energy supplies and further complicate and prolong solutions to the slump in the economy.

- Solar energy and fusion power are not expected to make significant contributions to the nation's energy needs until late in this century or early in the next *(10)*.

- Energy contributions from shale oil are not expected to provide any relief until 1980 or later *(10)*.

Shortages of natural gas and middle distillate heating oil will not be evenly distributed, and they can be expected to produce hardships in some areas this winter; the northeast is particularly vulnerable. The severity of the gas and heating oil shortages will be a function of geography, Federal Energy Administration (FEA) allocation regulations, and decisions made by local governments and large corporations.

Petrochemical Situation

U.S. petrochemical refineries are now operating near capacity. Even if crude oil supplies were unlimited, refined petrochemicals and their end products could remain in short supply until new refineries are built. However, if the economy remains sluggish, this would reduce demand and increase availability to purchasers in the health sector.

As an industry group, plastics producers are projecting little growth for the next several years. Plastics production in 1972 was estimated to be 23.6 billion pounds, up 20 percent from 1966. In 1960, the figure was about 3 billion pounds. From 1960 until the oil embargo of 1973, plastics production rose 12–15 percent per year *(2b)*. Demand for plastics, as a result of previously developed markets, may cause requirements for plastics to continue to grow unless the economic slowdown compensates for the stabilization of plastics production. Thus, if the economy rebounds, demand for plastics can be expected to seriously outstrip supply. This imbalance could cause rising prices and procurement difficulties for such hospital staples as disposable syringes, intravenous tubing, enema bags, and a number of other plastic products.

Due to the recently discovered relationship between angiosarcoma and occupational exposures of workers engaged in the production of polyvinyl chloride (PVC), the maximum permissible exposure levels were reduced on October 4, 1974 *(11)*. The cost of conforming to the lower exposure standards may force some of the smaller PVC producers out of business and encourage some of the larger manufacturers to increase their production levels to fill the gap; however, these adjustments will require an estimated 12 to 15 months. In the interim, manufacturers who use PVC to produce disposable hospital products may face tight market conditions. If the Society of the Plastics' Industry is correct and the more stringent occupational exposure levels actually cause PVC production levels to drop significantly, the health industry group could face a need to develop suitable substitutes. In this event, the manufacturers would have to modify their production technology and perform extensive efficacy and biological capatibility testing of products made from the new materials. These activities are costly, take time, and have no guaranteed outcome. Thus, the price and availability of hospital products now made from PVC will remain unsettled until adjustments to the new standards are made.

In general, planners and purchasers at health care facilities should be prepared for a continuation of the uncertain market conditions for petrochemicals and petrochemical end products for the foreseeable future. These uncertainties are likely to be most noticeable among disposable plastics items. Problems could become acute among products made from PVC *(12)*.

The pharmaceutical industry uses numerous organic solvents for extracting drugs and could find itself adversely affected if petrochemical shortages develop. It should also be noted that environmental considerations have had economic repercussions within the paper industry, and paper products are likely to continue to rise in price and become shorter in supply *(13a)*.

Health planners, looking ahead to implementing a national health insurance program, may perceive a need for additional energy and more manufactured products. If so, they should remember that their expanded activities may coincidentally conflict with an overall decline in the building of new electric generating facilities, which are being delayed for economic and environmental reasons *(6,14)*.

Health facilities can expect to receive preferred treatment from utility companies, and the health industries which produce disposable plastic products should be able to compete economically for restricted petrochemical supplies because of the high value-added characteristic of their products. Thus, in times of national shortage, the patient care sector is in a relatively favorable position. However, health planners would be ill-advised to develop a false sense of security by assuming that they will be spared from the direct and, more important, the indirect effects of the increasing difficulties in the nation's economy. These economic adversities, in large part, can be traced to diminishing domestic energy reserves, higher oil import costs, and balance of payments considerations. It now seems that health decisionmakers, in order to be effective, will need to follow developments on Wall Street and at the United Nations as closely as they have traditionally followed those on Capitol Hill.

Other Natural Resources

We have recently witnessed how the identification of the pending depletion of crude oil and natural gas has triggered a sequence of political and economic events which, in turn, have brought about energy, economic, and political problems for almost all industrially developed nations. The next major question is whether or not supplies of other raw materials vital to the U.S. economy may also be in short supply. Unfortunately, the answer is Yes. Estimates of future supplies of certain raw materials given in the table are excerpted from "Fuels, Minerals, and Human Survival" by Charles B. Reed *(15)*. In making these assumptions, Reed made generous allowance for discoveries of new reserves and major breakthroughs in extraction technologies. For these reasons, there is little room for a more optimistic outlook. (In developing his estimates, Reed used a model designed and used successfully for many years by M. King Hubbert. Hubbert's geological forecasts, once considered outrageous by his colleagues, have now been validated.)

Estimated years to peak production of certain raw materials and the primary exporting nations

Material	*Years to peak of world production*	*Exporting nations*
Asbestos	40	Canada, South Africa
Copper	60	Chile, Peru, Zambia, Zaire
Fluorite	30	Mexico, Spain, Italy
Gold	5–10	South Africa
Lead	60	Canada, Peru, Australia, Mexico
Mercury	40	Canada, Mexico, Spain, Italy
Silver	60	Canada, Peru, Mexico
Tin	45	Malaysia, Thailand, Bolivia, Brazil, Zaire

It is ironical that, at a time when crude oil is plentiful enough to be produced at a cost of 25 cents a barrel by the world's leading exporter, worldwide shortages, economic disruptions, governmental instability, and widespread global inflation can be traced to a rather brief oil embargo and increased prices. The lessons that should have been learned from this experience are more important than its irony. First, we should now know that the scientific sophistication which permits us to peer into the future and then to broadly disseminate what we learn is not benign. It permits nations to develop and implement economic strategies to advance their own interests. These policies will generally create hardships in other countries. Second, we should have noted that this serious sequence of events has been made possible by the establishment of international economies which have become so complexly interdependent that many nations, acting unilaterally or as a part of an economic bloc, can visit economic, political, and social hardships on many other countries.

We should also have become acutely aware that our scientific prowess in forecasting the availability and location of raw materials has, in part, been responsible for a shift in the economic balance of power between the industrialized and nonindustrialized nations. The highly publicized distribution and quantities of the world's remaining raw material resources have given the nonindustrialized countries a bargaining power they have not had in the past. The United States' massive, consumer-oriented, industrial complex consumes 40 percent of the raw materials now being produced and thus becomes the potential victim of its own technical sophistication.

It could be hoped that this recent experience which so clearly illustrated the interdependence of all nations would have brought about the beginning of an era of increased international cooperation. However, it now seems unrealistic to assume that other nations, having

seen the oil-exporting nations rise from poverty to wealth, may not try to follow suit. There are negotiations in progress which, if successful, will create OPEC-like economic alliances among the nations which export tin, copper, and bauxite. Two such alliances already formed are the Intergovernmental Council of Copper Exporting Countries whose members are Chile, Peru, Zambia, and Zaire; and the International Tin Council, whose members are Malaysia, Bolivia, Indonesia, Nigeria, Zaire, and Australia. These alliances have not yet developed sufficient internal accord to impose concerted sanctions on their exports; however, they are moving in this direction (*16,17*). It should be noted that Jamaica, acting unilaterally, recently raised the tax on bauxite (aluminum ore) exports 500 percent (*18*). The Jamaican government justified this action by stating that, given the increased oil prices it had to pay, it had no other alternative.

The implementation of economic and political strategies by nations brought together by the geological accident of possessing the same critically needed raw materials and a common desire to upgrade their own standards of living could bring about serious shortages in the United States and intensify problems in the economic sector. The mere potential for the creation of such multinational economic blocs is having repercussions in the financial community.

The uncertainties involved in acquiring needed raw materials are delaying long-term capital investments in production facilities, investments which would increase the capacity to manufacture the end products used in patient care and other important industrial sectors. For these reasons and many others, it would be shortsighted for health policymakers to view the recent shortages as an isolated or temporary phenonomon or one which has completed its cycle. To the contrary, these dislocations should have been perceived as the end of the world's traditional economic order and should have brought about a major effort to decrease both waste and consumption. As stated in my first sentence, there has been no evidence of any such undertaking.

In the long term, scientists assure us that there are limits to growth and that shortages of energy as well as many other critical raw materials are certain, irrespective of political or economic strategies (*15,19*). In the near term, we can clearly see that the United States is dependent upon international stability and unrestricted trade to avert the creation of artificial shortages and even more serious economic problems. Health care planners, even those who are optimistic about the immediate future, should recognize the need to take steps to reduce waste and unnecessary consumption so that it becomes possible to cope with long-range scarcities which, almost everyone agrees, are inevitable. In the process, planners should derive strategies to permit health care to continue even if particular supplies are temporarily disrupted by political or economic sanctions.

Planners and health facility administrators can take some immediate steps before the establishment of the council and in anticipation of the upcoming era in which the management of existing resources will be the new ethic. These steps are presented as recommendations and are based on the following assumptions and considerations. The assumptions are *(a)* that power in all forms will become more expensive to produce and will become a significant portion of a health facility's total operating budget, *(b)* that implementation of enforceable policies to reduce consumption and reclaim waste will begin to measure high on the cost-to-benefit scale, *(c)* that the nation is enroute to becoming a totally electric-powered society, and *(d)* that energy availability, even to hospitals which enjoy a high priority status, will become a serious problem in some parts of the country this winter and will become even more serious before the end of this decade unless some problems are unexpectedly resolved.

The health facilities most affected by the prevailing energy situation appear to be those whose power is generated by natural gas and those located in utility service districts in which electric power plants are experiencing start-up delays.

Before proceeding to the recommendations, I would like to note the following considerations which appear particularly relevant to hospital administrators:

- The free market system, to function effectively, must elicit economic competition, which tends to keep quality up and prices down. The system works effectively so long as supply is able to exceed demand, but we have recently experienced a period in which the demand for many hospital products exceeded the supply. If the economy begins to resume its growth, demand will continue to outstrip supply, and health facility purchasing officers will be dealing with suppliers who do not need to compete. In some instances, depending on the supplier's attitude, this will cause undue price increases and deteriorating quality. As large consumers, hospitals can expect to perceive this trend early and dramatically (*13b*).

- The conversion of the nation's power production modalities from the use of environmentally desirable oil and natural gas to coal and nuclear fuel will elevate the general population's exposure to the effluents of coal combustion and radiation. This change in power production facilities could alter a hospital's patient case mix in some areas. These energy-related dynamics may require some facilities to review staffing patterns and their medical equipment inventory to determine whether or not they are still consistent with the environment of the community they serve. In some instances, the building of a nuclear power plant in a hospital's service area will produce a need to train staff in the technical skills to handle and properly treat patients with radiation syndrome.

- Administrators of health facilities and leaders of major health associations would be well-advised to

adopt the official position that shortages exist and can be realistically expected to exist indefinitely. Further, they should formally acknowledge that prices of materials may ultimately approach levels which will reverse the existing cost-to-benefit analyses used to decide whether disposable materials or the labor costs involved for specific reusables are more advantageous. It is assumed that analyses of the reusables in question would include considerations of sterility but not be unduly swayed by considerations of convenience.

With the official adoption of such positions, it becomes administratively feasible to initiate policies designed to decrease waste and reduce consumption. In addition, it makes possible the training of existent staff or the hiring of additional staff to carry out these functions. The savings realized from such administrative initiatives have, in some instances, already been shown to more than offset the costs of redeploying or hiring the additional staff required to design and carry them out.

Recommendations

With the preceding assumptions and considerations in mind, I make the following recommendations:

1. That the nation's health leaders begin to monitor systematically the growing relationship between fast-breaking geopolitical, geophysical, political, economic, and technological developments that impinge on patient care delivery. Such a step would result in a much needed increase in interdisciplinary dialog. In turn, this broadened communication would provide greater assurance that long-term health care planning could be conducted in an atmosphere which recognizes the synergism which is beginning to engulf this activity.

In conjunction with this concern, I specifically recommend that health facility directors establish closer liaison with their local utility companies. Plans for health services which may call for increased power consumption should be discussed in detail with utility representatives so as to gain insight into the long-term outlook for power production for their particular service areas. Some utility companies have experienced difficulties in raising capital for plant construction, in acquiring access to dependable sources of coal or other fuels, or in obtaining a licence to operate a nuclear plant. Any of these conditions could force the utility to modify its long-term plans to expand generating capacity. In general, electric generating capacity will keep pace with increases in requirements, and health facilities will attain preferred customer status; however, there is sufficient uncertainty in this sector to warrant this recommendation. It is possible that converging forces in certain areas may make it impossible to meet increased demands, even those of preferred customers. As a part of this communication, inquiries can be made into the kind of the power plants scheduled for future service, and a determination can be made as to whether new or significantly increased environmental insults are likely to affect residents in the hospital's service area.

2. That all future construction be designed to reduce energy and material waste. A number of corporations, as a matter of sound business policy, provide free technical assistance on these matters, especially as they relate to the products they supply. Many utilities are also providing such services to conserve energy. Health facility administrators can avail themselves of these free services to upgrade the efficiency of their present operations and, in particular, they can take advantage of these opportunities when they are ready to initiate construction or undertake the provision of new services.

3. That the maintenance practices of health facilities be upgraded and expanded. Such an approach will lengthen the life of expensive equipment, increase performance efficiency, and ultimately result in reducing operating expenses. A fringe benefit to be derived from this approach is that it permits the facility to develop a greater degree of in-house repair capability, thus decreasing the facility's dependence on the availability of manufacturer-trained servicemen. During the 1973-74 energy crisis it became difficult, because of gasoline shortages, for service companies to get maintenance men to and from facilities to service life-support equipment. The development of self-sufficiency in servicing equipment is particularly critical to health facilities in rural areas.

4. That exploratory studies aimed at increasing the cooperative arrangements with other hospitals in the same medical service area be initiated. Centralized laundries, billing services, purchasing, sterilization, and laboratories might, in some instances, reduce costs and increase flexibility. A central purchasing office and warehouse might decrease problems for both the consumers and suppliers. Temporary shortages might be handled with less stress by dispensing critical items to a facility which has an identifiable need, rather than having each facility overstock for a contingency which may never occur. Suppliers could better gauge the demand, and perhaps, reduce any unwarranted overruns. The supplier, in the event of fuel shortages, would have a less complicated and less expensive delivery and sales route. Although a number of facilities already share services as a step toward cost reduction, the implementation of this concept is not proceeding as rapidly as it should.

5. That health facilities convert waste products to profit. Some waste products are beginning to acquire commercial value because of shortages. The corrugated cardboard boxes used to package hospital supplies create a disposal problem; however, the prices now being paid for cardboard have begun to justify the labor costs involved in packaging them for recycling. This procedure puts the recovered materials back into economic circulation, and in some cases, would provide an extraordinary source of revenue. Recycling many materials consumed by large facilities has advantages and should be seriously considered.

6. That disaster plans be reviewed and updated. The growth of the nuclear power industry and the huge increases projected for the mining and combustion of coal for power present some new and different considerations. Major respiratory disasters occurred in Donora, Pa., in 1948 and in London in 1952. Similar episodes could recur as more coal is used to generate power. The building of larger and more technologically complex nuclear power plants presents considerations which merit realistic assessment in any effective disaster plan. The numbers of people affected by nuclear accidents could, in the extreme, be very large. Disaster plans to accommodate properly potential nuclear accidents may have to be multi-hospital, regional, and multi-regional in scope.

My final recommendation is that the preceding recommendations be viewed as interim steps pending the establishment of a national council for health affairs related to energy and materials. Such a council could go much further than this paper goes in addressing the much broader health issues that are beginning to arise as a result of major changes occurring in the world. For too long a time, health planning has taken a view too narrow to accomplish its mission satisfactorily. A properly designed council, given appropriate authority and funding, could go a long way toward remedying this deficiency.

The financial sector has already established a structured mechanism by which it can effectively respond to changes. In 1971, the business community set up a national planning council. Its preamble states *(20)*:

> The Business Advisory Council on National Priorities was established in 1971 to foster a more effective business response to the challenges of the 1970s and beyond. Unlike many other business groups, the Business Advisory Council is composed primarily of corporate officials responsible for long range or strategic planning . . .
>
> The Business Advisory Council's program has three major elements: (1) the interchange of information among members and with Government and private experts . . .; (2) the development of analyses to illuminate areas of possible future change likely to be important to business; and (3) the development of recommendations for action by business and Government to shape change and establish national priorities in the best interest of business and the American Society.

If, then, other sectors are establishing organizations for the sole purpose of adapting to changes and helping create changes conducive to their best interests and the best interests of the nation, I respectfully submit that the time has come for the health sector to redefine its concept of what constitutes health's proper domain and begin to broaden its perspective to incorporate, within the mainstream of its planning activities, the significant events now occurring in the geopolitical, geophysical, political, financial, and environmental communities. I firmly believe that if this recommendation were to be accepted, the patient care sector would be better prepared, in every way, for whatever the future brings.

The health community can be a national force for change. It has come of age and should begin to accept the new responsibilities this increasingly significant role imposes. It must begin to structure a climate in which enlightened forces for change can occur, rather than allowing itself to be forced to react to the policies brought about by the aspirations and foresight of others. Health workers, as an overall social and political force, have been properly preoccupied with their efforts to improve the techniques required to better achieve humanitarian goals. But as the nation's access to vital resources is threatened and competition intensifies among national priorities, the health sector, as a community, must enlarge its role and speak out in its own interest and on behalf of the people it serves. Should health leaders fail in this regard, I believe raw materials shortages and rising prices will hurt our chances for better health care.

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